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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,665	04/09/2004	Chien-Min Sung	22762	8792

7590 04/11/2008
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Sandy, UT 84091-1219

EXAMINER

RACHUBA, MAURINA T

ART UNIT	PAPER NUMBER
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3723

MAIL DATE	DELIVERY MODE
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04/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/821,665	Applicant(s) SUNG, CHIEN-MIN	
	Examiner Maurina Rachuba	Art Unit 3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,9-13,27 and 30-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,9-13,27 and 30-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4-7, 9-13, 27, and 30-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al, 6,722,952 in view of Homola, 2004/0096705 and Hayden, 4,606,738.

3. Regarding claims 1, 4-7, 9-13, and 42-48, '952, see for example figure 2 and its description, as well as other embodiments, a fixed abrasive tool, comprising a substrate **24** which is planar; and a polishing layer **16** attached to the substrate, the polishing layer having an organic matrix with abrasive particles therein and being a continuous layer, attached to the substrate at an organic matrix interface **12**, the polishing layer including a plurality of projections spaced apart at a projection loading ratio of from about 0.05 to about 0.5 (see column 11, lines 55 through column 12, lines 3, the examiner considers that the number of composites per square centimeter is directly related to the loading ratio, defined by applicant as the amount of surface which is covered by the composites); wherein the projections are cubic (see figures 1 and 2); the projections are formed such that the fixed abrasive tool has a loading ratio of from about 0.1 to about 0.3 (see above); the organic matrix comprises a member selected from the group consisting of epoxy, polyimide, polyethylene terephthalate,

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polytetrafluoroethylene, polyurethane, polycarbonate, polyester, and mixtures thereof (see column 3, lines 47 through column 5, lines 63) ; the substrate comprises a member selected from the group consisting of metals, polymers, and composites or alloys thereof (see column 5, lines 55 through column 2, lines 20; and the fixed abrasive tool is configured as a CMP polishing pad. Further, '952 discloses the polishing layer further comprises a filler material, and abrasive concentration of from about 5 vol% to about 60 vol% or from about 10 vol% to about 30 vol% (see column 7, lines 20-24); the polishing layer further includes an intermediate material (coupling agent, see column 9, lines 5-27) which forms chemical bonds between the diamond particles and the organic matrix; a filler material having a Moh's hardness less than 6 (see column 18, line 51, calcium metasilicate has a Mohs hardness of less than 6, see the attached chart); the polishing layer is substantially free of abrasive particles having a Moh's hardness greater than about 6, exclusive of the nanodiamond particles; and the organic matrix further includes an organic binder and a softening agent (see column 4, lines 39 through column 5, lines 10).

4. '952 does not disclose that the abrasive particles are nanodiamonds, having a particle size from about 1 nm to about 50 nm or from about 2 nm to about 10 nm, or that the nanodiamond particles include a carbonaceous coating; the nanodiamond particles have a Moh's hardness greater than about 9.5; or that the nanodiamond particles are synthesized by an explosion synthesis process. In a similar apparatus, '705 teaches that it is known to use nanodiamonds in a polishing pad. The nanodiamonds have a Mohs hardness greater than about 9.5 (diamond has a Mohs hardness of 10); and are

in the claimed size ranges. Because both references teach fixed abrasive polishing pads, it would have been obvious to one skilled in the art to substitute one known abrasive for another, to achieve the predictable result of smoothing a workpiece surface to the smallest desired roughness.

5. Neither '952 or '705 teach a carbonaceous coating. In a similar abrasive tool, (column 1, lines 37-47), '738 teaches that it is old and well known to coat diamond abrasive particles with a carbonaceous (silicon carbide) coating, to provide for a positive locking of the diamond to the bond, see column 3, lines 3-8. It would have been obvious to one of ordinary skill to have provided '952 with a carbonaceous coating as taught by '738, for the predictable result of providing a better bond between the diamond and matrix.

6. Regarding claims 27 and 30-41, please refer to the rejection above. Further, '952 discloses using pressure within the claimed range (see column 19, lines 1-50); and uses a lubricant that is the same material as applicant's solvent, therefore, without further evidence, can be considered a solvent, see column 16, lines 47-59. Regarding the rate of polishing and the rate of dissolution of the matrix, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the tool in such a way that the rate of polishing and dissolution were achieved, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Here, the general conditions of material removal to planarize the workpiece and dissolution, the matrix dissolving or eroding to provide new abrasive, is

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disclosed by '952. Regarding the surface roughness of the workpiece as a result of finishing, the examiner notes that the finer the abrasive used, the smoother the surface finish will be, and that one of ordinary skill in the art would expect a surface roughness measured in nm when using a nanoabrasive, as opposed to a larger abrasive, which would produce a rougher surface, measured in μm .

Response to Arguments

7. Applicant's arguments, see pages 8-9, filed 16 January 2008, with respect to the rejection(s) of claim(s) 8 under Goers et al, 6,722,952 in view of Homola, 2004/0096705 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Goers et al, 6,722,952 in view of Homola, 2004/0096705 and Hayden, 4,606,738. This action is made non-final to allow applicant fair opportunity to respond.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maurina Rachuba whose telephone number is 571 272 4493. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on 571 272 4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. Rachuba/
Primary Examiner, Art Unit 3723